"Not listed! Eggs in a Basket!"

by Dean K. Wilson, P.E.

My newly-formed fire alarm installation company just lost a bid with an estimated value of over $11 million. A medium-sized college campus in the northwest had requested bids on the complete replacement of all fire alarm systems throughout their property. This included 16 major buildings and 11 minor buildings.

We proposed a *Code*-compliant, centralized, computer-based control system. To do this, we hired a woman with a Master's degree in computer science to oversee a team of five coders who would develop a unique software to manage this project. She proposed creating our own hardware and software system that would have many more features than any commercially available fire alarm system. She also proposed that we have a centralized system with only remote communications units at each building. She intended this design to limit the maintenance costs and improve the overall reliability of the system—since the single-point of control would minimize the chance that anyone could interfere with the equipment installed at each campus building.

Upon receiving the bids, the college hired a fire protection engineering consulting firm to help sort out the apparently diverse proposals. When the college declined our bid, they included a very brief explanation from the consultant: "Not listed! Eggs in a basket!"

Can you help us understand why we lost this bid even though our hardware and software costs were several millions of dollars less than the competing bids?

Yes, I am happy to explain this to you by echoing the comment of the consultants: "Not listed! Eggs in a basket!"

NFPA 72-2013, *National Fire Alarm and Signaling Code*®, requires the following:

> **10.3.1** Equipment constructed and installed in conformity with this Code shall be listed for the purpose for which it is used.

Every piece of hardware must bear the listing mark of a nationally recognized testing laboratory indicating that it has received listing for the specific use. Note the definition of "listed":

> **3.2.5* Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.
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> **A.3.2.5 Listed.** The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

In other places within the *Code* that deal with specific systems or usage, software must also bear the listing mark of a nationally recognized testing laboratory for the specific use:

> **26.3.6.3** Computer-aided alarm and supervisory signal–processing hardware and software shall be listed for the purpose.

Since you chose to develope a unique combination of hardware and software for use in this campus application and did not submit this equipment for listing by a nationally recognized testing laboratory, in spite of your intention to provide a *Code*-compliant system, your whole approach

would fail to meet the most basic requirements of NFPA 72-2013, *National Fire Alarm and Signaling Code*®. Thus, the comment from the fire protection engineering consultants: "Not listed!"

Let me next explain the "Eggs in a basket!" comment. NFPA 72-2013 states:

> **1.1 Scope.**
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> **1.1.1** *NFPA 72* covers the application, installation, location, performance, inspection, testing, and maintenance of fire alarm systems, supervising station alarm systems, public emergency alarm reporting systems, fire warning equipment and emergency communications systems (ECS), and their components.
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> **1.1.2** The provisions of this chapter apply throughout the Code unless otherwise noted.
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> **1.2* Purpose.**
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> **A.1.2** Fire alarm systems intended for life safety should be designed, installed, and maintained to provide indication and warning of abnormal fire conditions. The system should alert building occupants and summon appropriate aid in adequate time to allow for occupants to travel to a safe place and for rescue operations to occur. The fire alarm system should be part of a life safety plan that also includes a combination of prevention, protection, egress, and other features particular to that occupancy.
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> **1.2.1** The purpose of this Code is to define the means of signal initiation, transmission, notification, and annunciation; the levels of performance; and the reliability of the various types of fire alarm systems, supervising station alarm systems, public emergency alarm reporting systems, fire warning equipment, emergency communications systems, and their components.
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> **1.2.2** This Code defines the features associated with these systems and also provides information necessary to modify or upgrade an existing system to meet the requirements of a particular system classification.
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> **1.2.3** This Code establishes minimum required levels of performance, extent of redundancy, and quality of installation but does not establish the only methods by which these requirements are to be achieved.
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> **1.2.4*** This Code shall not be interpreted to require a level of protection that is greater than that which would otherwise be required by the applicable building or fire code.
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> **A.1.2.4** The intent of this paragraph is to make it clear that the protection requirements are derived from the applicable building or fire code, not from *NFPA 72*.

You will note that even though these paragraphs offer very clear parameters within which NFPA 72-2013 functions, nowhere does the *Code* deal with the issue of "design strategies." When

you set out to create a unique design that placed all of the control equipment for this multi-building fire alarm system in a single location, you chose a specific design strategy. You stated that you made this decision to reduce maintenance costs and to prevent the distribution of equipment widely throughout the campus in a manner that might subject that equipment to tampering.

As worthy as your stated goals may appear, they violated a concern of the fire protection engineering firm whom the college engaged to review the bids. That concern: “Eggs in a basket!”

By centralizing all control for the system at a single location, you effectively introduced a single point of failure for this very large, very complex, and very important fire alarm system. The very lives of the students and faculty members depends on the reliability and dependability of the fire alarm system.

No doubt the fire protection engineering consultants expected to see a more distributed fire alarm design strategy, wherein each building would have its own fire alarm system control unit. This would allow each individual campus building to have fire alarm service independent of every other building. The basic functions of detection and notification could take place wholly within a particular building. In other words, the fire alarm system for each building would remain self-contained and less subject to an event at some other location on the campus.

The fire protection engineering consultants also expected the individual building fire alarm systems to connect to a centralized receiving location where the campus security department could receive alarm, supervisory, and trouble signals from the specific buildings and take appropriate action to notify the fire department, dispatch security personnel, and notify maintenance personnel—depending on the nature of the signal received.

Centralization has some very attractive advantages. But, centralization also exposes fire protection systems to some very unattractive perils. Putting all the fire protection eggs into a single

basket can prove dangerous. For example, in your design, the campus buildings only contain communications equipment to transmit detection signals to, and receive notification signals from, the central location. Any destructive event at the central location would effectively impair all of the fire alarm system for the entire campus. The fire alarm protection for each building could no longer function.

The best design approach weighs all the factors of each individual property and chooses a strategy that fits the goals of the owner and other stakeholders, while ensuring reliability and dependability of the fire protection system. Many times a combination of strategies will integrate to provide the best level of protection for a particular property.

Complying with the *Code* has great importance. But, once you have designed a truly *Code*-compliant system, you must also make certain you have made proper choices to ensure the chosen strategy will actually provide the life safety, property protection, mission protection, heritage preservation, and environmental protection the stakeholders need.

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